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71 Applicant: **Matsushita Electric Industrial Co., Ltd.**
1006, Oaza Kadoma
Kadoma-shi Osaka-fu, 571 (JP)

72 Inventor: **Tomoda, Huhisa**
3-14 Miyukihigashimachi
Netagawa-shi, Osaka-fu 572 (JP)

Shimada, Yasuomi
7-204 Myokenzaka, 3-chome
Katano-shi, Osaka-fu 576 (JP)

74 Representative: **Crawford, Andrew Birkby et al**
A.A. THORNTON & CO. Northumberland House 303-306
High Holborn
London WC1V 7LE (GB)

54 **Optical disk reproducing apparatus.**

57 The invention relates to an optical disk reproducing apparatus, such as a compact disk player or the like, facilitating an operation for recording on a cassette tape a plurality of information recorded on a disk by combining an optical disk reproducing apparatus with a cassette tape recorder and by arbitrarily editing a plurality of the foregoing information recorded on a disk. The tape length specified by the operator is automatically divided into a half to obtain a length of one side of a cassette tape, and the number of pieces of music on the disk which can be reproduced within the reproduction time corresponding to the time of the length of one side of said cassette tape is calculated, thereby causing the music number(s) of the piece(s) of music to be stored.

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Description

Optical Disk Reproducing Apparatus

Optical disk reproducing apparatus such as compact disk players have come into wide use in recent years.

On the optical disk of the foregoing are generally recorded information, such as music, together with index information such as playing time in connection with the foregoing recorded information.

In an optical disk reproducing apparatus, it has been proposed to utilize the index information, such as the foregoing playing time, to edit recorded information, such as music, on to a magnetic tape by combining arbitrary program reproduction and a tape recorder.

Conventionally, an optical disk reproducing apparatus of this type has a construction as shown in Fig. 5 through Fig. 7.

That is to say, a signal detecting unit 1 comprising a light pickup or the like reads out the recorded information, e.g. music information, or the index information, e.g. playing time information, recorded on an optical disk (hereafter simply called a disk). A signal output unit 2 processes the recorded information read by the signal detecting unit 1 and converts it into an audio signal which is output. A control unit 3 controls the signal detecting unit 1 and the signal output unit 2 and drives a display unit 4 which displays the index information, such as the playing time, read by the signal detecting unit 1. A key switch unit 5 comprises a play key 5a (fig. 6) which commands the control unit 3 to start playing, a reproduction time specifying key 5b which inputs arbitrary reproduction time into the control unit 3, and arbitrary time input keys 5c. The control unit 3 includes a reproduced music operation unit 6 which calculates the number of pieces of music which can be reproduced in the specified reproduction time (input by using the reproduction time specifying key 5b and the arbitrary time input key 5c), calculates and stores the playing music in a disk.

The operation of the known apparatus will now be explained with reference to fig. 7 which is a flowchart.

Whether or not the play key 5a is depressed is determined by the step 1, and if not depressed, the apparatus moves to step 2, and if depressed, the apparatus moves to step 4. In step 2, whether the reproduction time was inputted by the reproduction time specifying key 5b and the arbitrary time input key 5c is determined, and if specified by these keys, the apparatus moves to step 3, and if not specified by these keys, the step then returns to step 1. In step 3, the number of pieces of music specified in a disk which can be reproduced within the specified reproduction time is calculated and the music number of the specified music is stored. In step 4, a piece of the music corresponding to the music number stored in the step 3 is played and the step moves to the step 5. In step 5, whether all of the specified stored pieces of music have been played is determined and if not played, the step returns to the step 4, and if all the pieces of music have been

played, the playing is ended, and the step returns to the step 1. If the reproduction time is not specified when the step moved to the step 4, all the pieces of music on a disk are played and the playing is ended.

However, in a conventional construction as described above, when recording on a magnetic tape, the tape length had to be halved by the user to obtain the time of one side of the tape before manual input of the reproduction time, and further, in order to input such reproduction time, it was necessary to repeat the number key which corresponds to such time is selected from the key switches and depressed.

The present invention overcomes conventional problems such as those above and provides an optical disk reproducing apparatus, wherein when a tape length is specified, it is possible to perform inside the apparatus the calculation to halve the tape length and to input a certain specified tape length using one key switch.

In particular, an embodiment of the present invention comprises a fixed time storage unit which stores data indicative of prearranged fixed units of time, an arbitrary time input means for inputting an arbitrary time into the control unit, a tape length specifying means which specifies the control unit with the length of a magnetic recording tape to be used to record the playing signal of the disk by the foregoing fixed time storage unit and arbitrary time inputs means, a display unit which displays the tape length specified by the tape length specifying means, a specified reproduction time division unit to calculate half of the specified tape length, and a reproduced music operation unit which calculates the number of pieces of music on a disk that can be reproduced within the reproduction time obtained by the foregoing division unit and stores the music numbers of the calculated number of pieces of music.

The operation of the above embodiment of the present invention is as follows:

That is to say, an input time is specified to the control unit by the tape length specifying means, the time of one side of a tape is obtained by the specified reproduction time division unit by halving the input time specified, the number of pieces of music on a disk that can be reproduced within the time of one side of the tape is calculated by the reproduced music operation unit, and the music numbers of the foregoing number of pieces of music on the disk are stored so that it is possible to input the reproduction time easily.

An advantage provided by embodiments of the present invention is that it is no longer necessary for a user to calculate the time of one side of a cassette tape used for recording, thereby tape length entry is facilitated.

Embodiments of the present invention will hereafter be described by referring to the drawings, in which Fig. 1 is a block diagram showing an embodiment of an optical disk reproducing apparatus.

tus according to the present invention, Fig. 2 is a block diagram showing parts thereof, Fig. 3 is a perspective diagram of the appearance thereof, Fig. 4 is a flowchart of tape length specification by the apparatus, Fig. 5 is a block diagram of a conventional embodiment, Fig. 6 is a perspective diagram of the appearance thereof, and Fig. 7 is a flowchart thereof.

In Fig. 1 through Fig. 4, the signal detecting unit 11 and the signal output unit 12 have the same functions as those of the conventional embodiments. A control unit 13 controls the signal detecting unit 11 and the signal output unit 12. A display unit 14 is provided for displaying the playing time and the specified reproduction time and so forth. A key switch unit 15 comprises a play key 15a which gives the control unit 13 a command to start playing, a tape length specifying key 15b which specifies to the control unit the length of the magnetic recording tape to be used for recording the reproduction signal of the disk, and an arbitrary time input key 15c for inputting arbitrary time when specifying the tape length. The control unit 13 includes a specified reproduction time division unit 17 wherein the time (length) of one side of the tape is obtained by halving the reproduction time specified by the tape length specifying means. The tape length specifying means specifies the tape length by means of the fixed time storage unit 19, which stores data indicative of prearranged fixed times of 90 minutes, 60 minutes, and 46 minutes, and the arbitrary time input means 20 for inputting an arbitrary time into the control unit 13.

The control unit 13 also includes the reproduced music operation unit 16 which calculates the number of pieces of music in a disk that can be reproduced within the time of one side of the tape (obtained by the specified reproduction time division unit 17) and stores the music numbers of the foregoing number of pieces of music in the disk.

With respect to the embodiments of the present invention constituted as above, operations thereof will be described using the flowchart shown in Fig. 4.

In Fig. 4 (a), step 1, step 4, and step 5, represent the same operations as those of the conventional embodiments and the descriptions thereof are therefore omitted. In step 6, the tape length specifying key 15b and the arbitrary time input key 15c are used to specify the length of the magnetic recording tape and the step moves to the step 2. Fig. 4 (b), shows in detail the steps making up step 6. Whether the tape length specifying key 15b was depressed is determined in the step 11, and if depressed, the step moves to the step 12, and if not depressed, then the step moves to the step 1. In step 12, the display unit 14 displays a time information of 90 minutes which is stored in the fixed time storage unit 19 to establish this 90 minutes as the specified reproduction time and the step moves to the step 13. In step 13 through step 16, the same operations as those of the steps 11 and 12 are repeated to change the fixed values sequentially from 60 minutes to 46 minutes. In step 17, whether the tape length specifying key was depressed is determined again, and if depressed, the step moves

to the step 18, and if not depressed, the step moves to the step 2. In step 18, in order to indicate that the mode is the arbitrary time specifying mode, 0 minute is displayed and the step moves to the step 19. In step 19, the arbitrary time input key 15c specifies the tape length and the step moves to the step 2. In step 2, whether the tape length was specified in the step 6 was determined, and if specified, the step moves to the step 7, and if not specified, then the step returns to the step 1. In step 7, a half the time specified in the step 6 is obtained by the specified reproduction time division unit 17, the results of the calculation accomplished by the division unit 17 being displayed as the time of one side of the tape if necessary, and the step moves to the step 3. In step 3, the number of pieces of music on a disk which can be reproduced within this time of one side of the tape is calculated, the music numbers of such pieces of music are stored and the step returns to the step 1.

As stated above, according to this embodiment of the present invention, it is possible to specify with one key switch a tape length of 90 minutes, 60 minutes, or 46 minutes (which occupy the most part of a compact cassette tape) and the halving of the specified time takes place in the apparatus, thereby eliminating the necessity for the operator to calculate the time of one side of the tape.

In the above embodiment, since it is assumed that the tape length specifying means operates, the embodiment which has both the fixed time storage unit and the arbitrary time input means and automatically edits the music that can be reproduced within a specified time is described. However, other embodiments may be equipped either with the fixed time storage unit or with the arbitrary time input means or otherwise equipped with a reproduced music operation unit which can specify the pieces of music to be reproduced in any sequences and can edit and operate such specified pieces of music.

Claims

1. An optical disk reproducing apparatus comprising a tape length specifying means which specifies to a control unit a length of magnetic recording tape to be used for recording a playing signal on a disk, a display unit which displays a tape length specified by the tape length specifying means, a specified reproduction time division unit which obtains a half the length of the specified tape length, and a reproduced music operation unit which calculates the number of pieces of music on a disk that can be reproduced within a reproduction time obtained by the division unit, stores the music numbers of said pieces of music in a disk or edits operates arbitrarily specified musics.

2. An optical disk reproducing apparatus according to claim 1, wherein said tape length specifying means has a fixed time storage unit which stores a prearranged fixed time and a fixed tape length specifying means which

specifies a tape length to the control unit by specifying the time stored in said fixed time storage unit.

3. An optical disk reproducing apparatus according to claim 1, wherein the tape length specifying means has a fixed time storage unit which stores a prearranged fixed time, a fixed tape length specifying means which specifies the control unit with a tape length by specifying the time stored in said fixed time storage unit, an arbitrary time input means which inputs an arbitrary time into the control unit, and an arbitrary tape length specifying means which specifies an arbitrary tape length to the control unit by using said arbitrary time input means.

4. An optical disk reproducing apparatus according to claim 2 or claim 3, wherein the fixed time comprises 90 minutes or 60 minutes or 46 minutes.

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Fig. 1

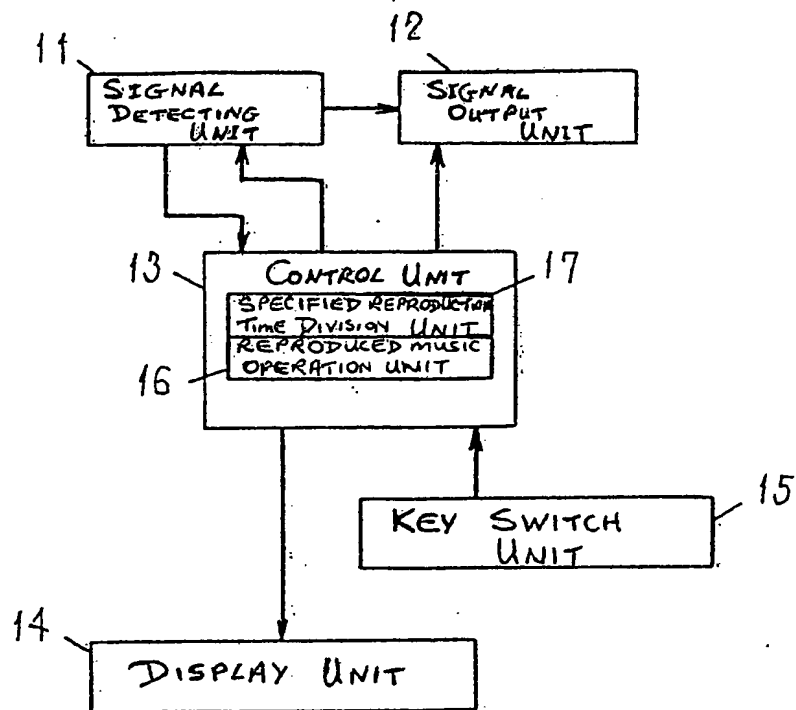
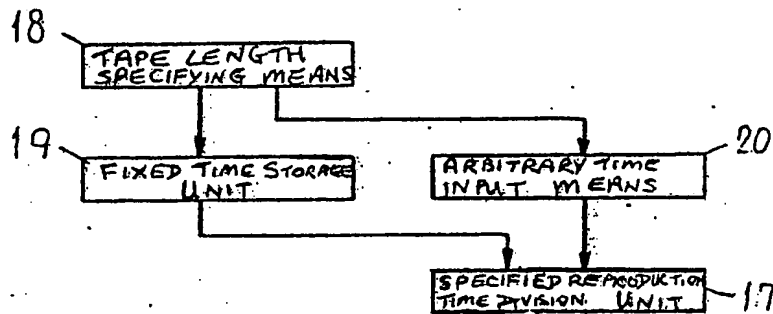
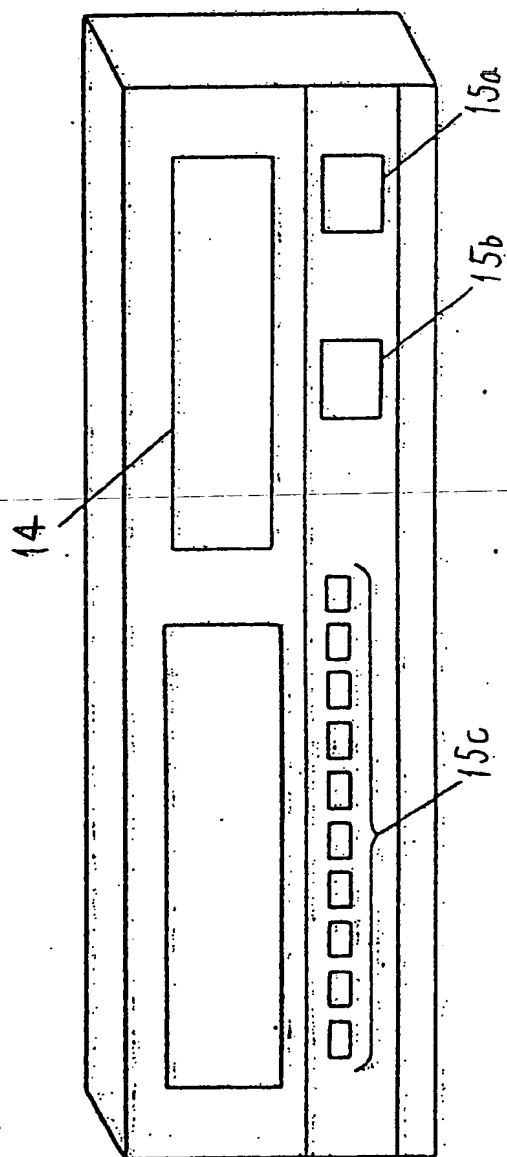


Fig. 2



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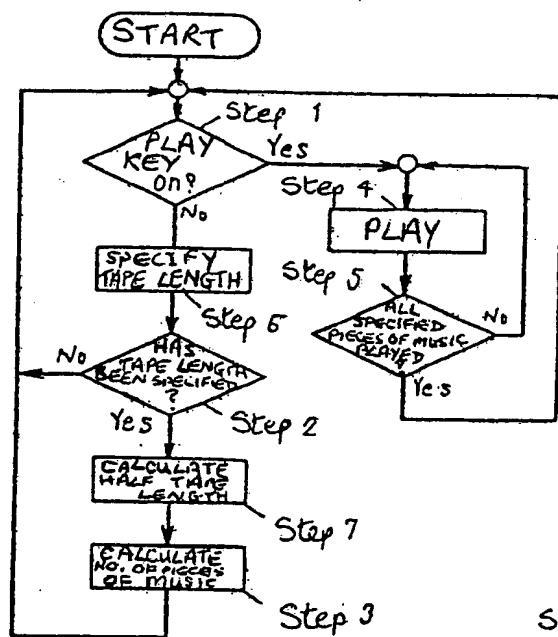
Fig 3



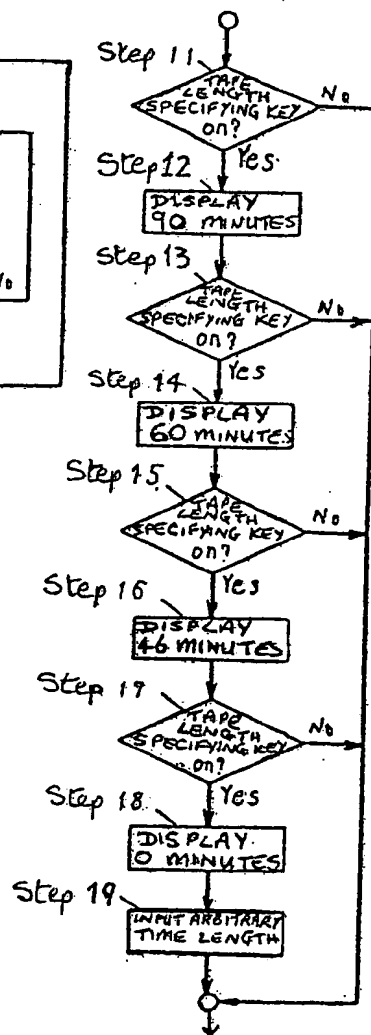
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Fig. 4

(a)

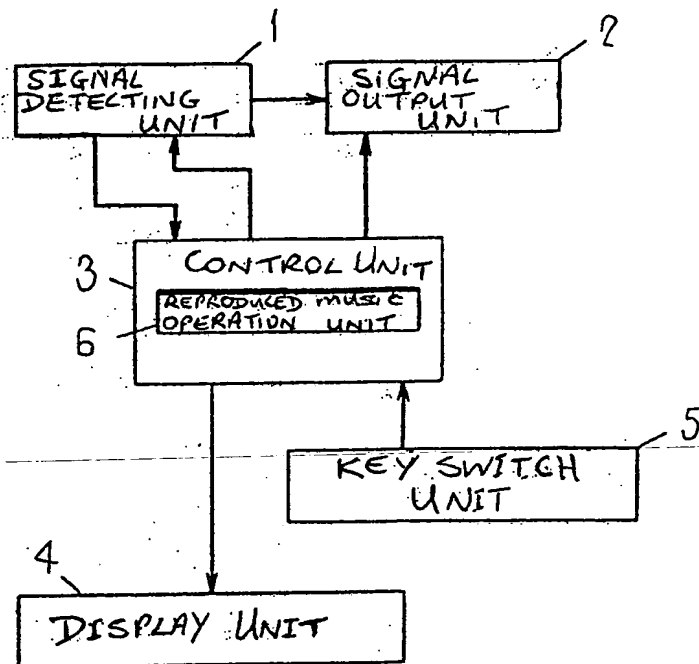


(b)



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Fig. 5



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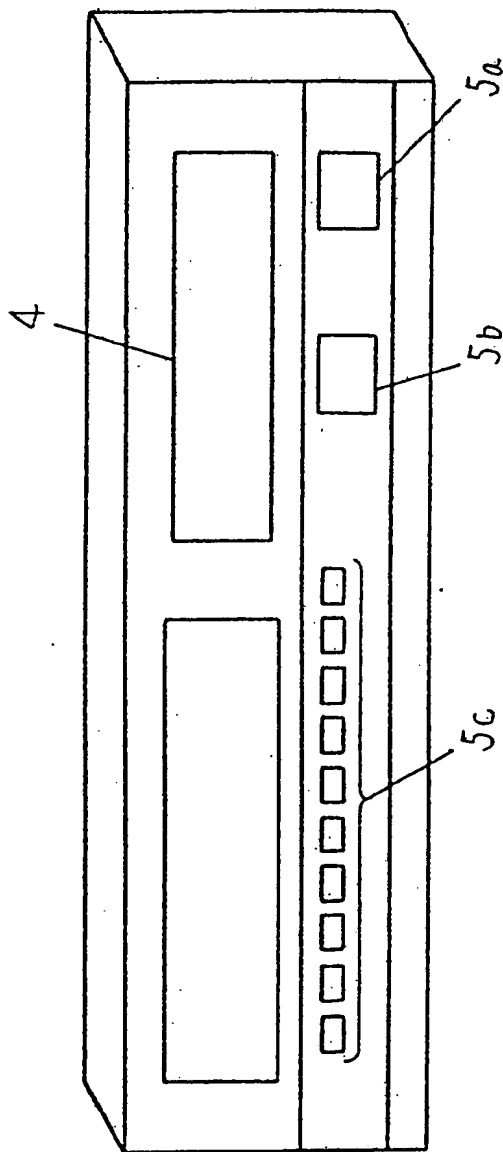
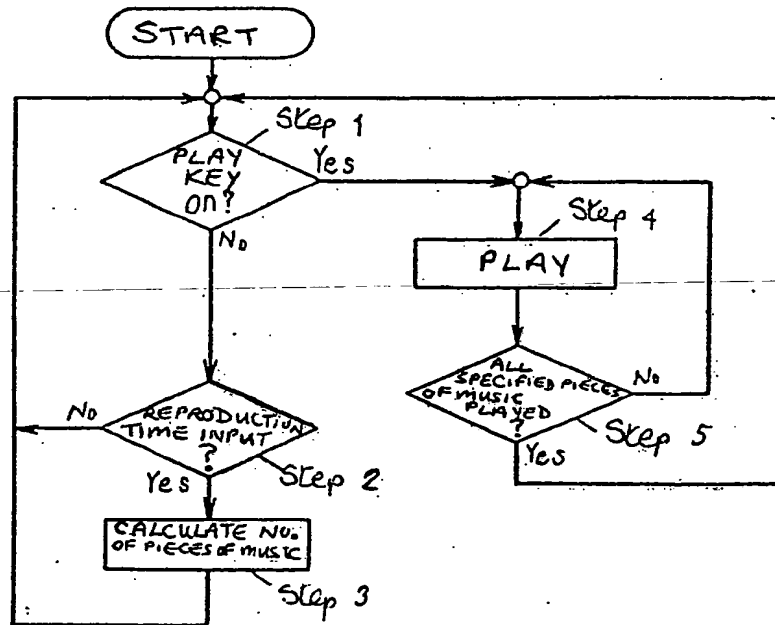


Fig. 6

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Fig. 7



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71

Applicant: Matsushita Electric Industrial Co.,
Ltd.
1006, Oaza Kadoma
Kadoma-shi Osaka-fu, 571(JP)

72

Inventor: Tomoda, Huhisa
3-14 Miyukihigashimachi
Netagawa-shi, Osaka-fu 572(JP)
Inventor: Shimada, Yasuomi
7-204 Myokenzaka, 3-chome
Katano-shi, Osaka-fu 576(JP)

74

Representative: Crawford, Andrew Birkby et al
A.A. THORNTON & CO. Northumberland
House 303-306 High Holborn
London WC1V 7LE(GB)

54

Optical disk reproducing apparatus.

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European Patent
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EUROPEAN SEARCH REPORT

Application Number

EP 88 30 0461

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	PATENT ABSTRACTS OF JAPAN vol. 10, no. 369 (P-525)(2426) 10 December 1986, & JP-A-61 162876 (FUJITSU TEN LTD) 23 July 1986, * the whole document *	1, 3	G11B27/02 G11B27/34 G11B31/00
A	EP-A-0051259 (TOKYO SHIBAURA DENKI KABUSHIKI KAISHA) * page 6, lines 2 - 21 *	1	
A	DE-A-2837111 (SONY CORP.) * page 23, line 31 - page 24, line 4; figure 3 *	2	
A	GB-A-2030755 (NV PHILIPS' GLOEILAMPENFABRIEKEN) * page 6, lines 59 - 76; claim 1 *	1, 2	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			G11B
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 19 JUNE 1990	Examiner GERARD E.A.S.
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